

**MICHIGAN ENVIRONMENTAL SCIENCE BOARD
CHLORINE PANEL**

**MEETING SUMMARY
WEDNESDAY, MARCH 30, 1994
PLANT AND SOIL SCIENCE BUILDING, ROOM A-279
MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN**

PANEL MEMBERS PRESENT:

Dr. Lawrence Fischer, Chair
Dr. Bette Premo
Dr. Eileen van Ravenswaay
Dr. Raymond Demers

PANEL MEMBERS ABSENT:

Dr. Richard Cook

BOARD STAFF PRESENT:

Mr. Keith Harrison, Executive Director
Ms. Shirley Willis, Administrative Officer
Mr. Jesse Harrold, Environmental Officer

I CALL TO ORDER

Dr. Lawrence Fischer, Chair, called the meeting of the Michigan Environmental Science Board (MESB) Chlorine Panel to order at 1:12 p.m.

II EXECUTIVE DIRECTOR'S REPORT

Mr. Keith Harrison, MESB Executive Director, indicated that he had provided the MESB Chlorine Panel members with correspondence from Mead Publishing Paper Division regarding how they are impacted by chlorinated compound regulations, a document developed by Warner, Norcross & Judd which looks at and compares Michigan's Rule 57 and the Great Lakes Initiative, and a list of the chlorinated compound-related articles which have been transmitted to the Panel to date. Mr. Harrison also reported that he and Dr. van Ravenswaay had attended a seminar on the toxicology and environmental fate of Atrazine which was put on by the Michigan Department of Agriculture (MDA) and the Ciba-Giegy Corporation. He indicated that the data from that seminar would be sent to the Panel members. Finally, Mr. Harrison introduced Mr. Jesse Harrold, who will be assisting on various environmental issues coming before the MESB Panels.

III PRESENTATIONS

Ms. Lynelle Marolf, Michigan Department of Natural Resources (MDNR), gave a presentation on Public Act 307. Ms. Marolf's presentation is outlined in Attachment 1.

Dr. Premo asked Ms. Marolf how particular substances were chosen for regulation in Michigan, whether MDNR incorporated the United States Environmental Protection Agency's (USEPA's) toxic substances list in its own list, and whether MDNR's criteria and clean-up procedures were similar to the USEPA's. Ms. Marolf replied that MDNR's definition of hazardous substances is very broad and takes into account virtually any substance that has been identified at the site of environmental contamination. A hazardous substance is defined under Public Act 307 as anything which is or may become injurious to public health, safety, welfare or environment. MDNR uses algorithms and regulations to develop cleanup criteria. There have been circumstances where insufficient data are available to develop criteria. In these cases, background, method detection limits or the one in a million carcinogen factor is employed. MDNR's clean up procedure uses a general applicable criteria approach. The approach used by the USEPA is fundamentally different from the MDNR's approach. The USEPA uses an acceptable risk range for carcinogens when evaluating superfund sites. The USEPA's approach to non-carcinogens is essentially the same as that used by MDNR.

Dr. Premo asked if Ms. Marolf would characterize MDNR's approach as more stringent than the USEPA's approach. Ms. Marolf indicated that because of the site-specific nature of both approaches, Michigan's approach could be predictably more stringent or less stringent.

Dr. Fischer asked if MDNR had classified different compounds into categories and if MDNR would consider any chlorine-containing compounds encountered at a site clean up as hazardous. Ms. Marolf replied that MDNR would prefer to use chemical specific data rather than to generalize. The option always exists for new data to be gathered and added to MDNR data base for a specific compound. The LD₅₀ (median lethal dose) is MDNR's minimum toxicity requirement. She indicated that she was unaware of any encounter with a contaminant at a site where MDNR did not have any data.

Dr. Fischer also asked how MDNR would add a compound to its toxics list. Ms. Marolf indicated if a new compound was identified in a broad scan analysis, using USEPA methods, from a new site, the MDNR staff toxicologist would conduct a literature search to make a determination if there were sufficient data to calculate criteria. In situations where there may be insufficient data, suspected compounds may still appear on the hazardous substances list and be noted as having insufficient data.

Dr. Demers asked what percentage of toxic substances discovered at PA 307 sites are chlorinated. Ms. Marolf replied that that has not been determined, but the data are available to make the determination.

Dr. Premo asked how MDNR adds new compounds which occur on the federal list. Ms. Marolf indicated that MDNR's criteria calculation process, and therefore its list, is driven more by what material MDNR encounters at the various sites of contamination than by what appears on the USEPA list.

Ms. Cathy Simon, MDNR Air Quality Division, made a presentation on the various rules relating to chlorine under the state's Air Pollution Act. Her presentation is summarized in Attachment 2.

Mr. Harrison asked how well the MDNR's air regulations and rules were being enforced. Ms. Simon replied that the new source regulations are comprehensive and well enforced. The rules provide MDNR with several mechanisms for dealing with all compounds. In addition, there are also mechanisms within the rules for dealing with special concerns in terms of other routes of exposure and additive effects. Finally, the rules allow evaluation from either a control technology or health approach. The MDNR does not have an existing source program or a program to look at atmospheric deposition under the state rules, however. The federal Clean Air Act does look at both new and existing sources. A noted deficiency under the federal program is its reluctance to use its authority to set lesser quantity emission rates for defining major sources.

Dr. Fischer asked how MDNR determines if its regulations are effective in terms of protecting health. Ms. Simon answered that it was a judgement call since the MDNR does not really have the resources to follow up with confirming epidemiological studies. Dr. Demers commented that while epidemiological studies would be completely out of the cost range, air monitoring may not be. Ms. Simon indicated that even with air monitoring, the cost and current limitations in terms of technology prohibit this avenue being used as a tool to conclusively measure success or failure. Dr. Demers asked if MDNR uses the air monitoring data generated by the Wayne County Air Pollution Control Program. Ms. Simon indicated that the MDNR does have access to that data. Wayne County samples for the more traditional type of pollutants like particulates. Some trend data are now available for this type of information since both the state and federal programs have addressed this area for many years.

Dr. Premo asked if MDNR plans to propose any additional standards in the near future. Ms. Simon answered that the state does not have anything planned at this time, but the federal government will be implementing Maximum Achievable Control Technology (MACT) standards for area sources and residual risk standards for major sources. Dr. Fischer asked if MDNR deals with chlorinated compounds as a special class and whether chlorinated compounds received special attention in waste incineration. Ms. Simon replied that chlorine-containing compounds in both instances are treated as individual compounds. Dr. Fischer also asked if Ms. Simon thought MDNR could have a reasonable impact on lessening the levels of volatile organic compounds (VOCs) emanating from existing sources if existing sources came more under MDNR's jurisdiction. Ms. Simon answered yes.

Ms. Deborah MacKenzie-Taylor, MDNR Waste Management Division, presented a summary of MDNR's waste management program. Her presentation is outlined in Attachment 3.

Mr. Harrison asked Ms. MacKenzie-Taylor whether current MDNR programs were working and whether MDNR considered those programs adequate to protect public health and the environment. Ms. MacKenzie-Taylor answered that current rules and regulations are adequate, but whether the MDNR is able to effectively administer the rules, especially for groundwater, is questionable. Resources are limited. She stated that she felt that the hazardous and solid waste programs were being administered effectively.

Ms. MacKenzie-Taylor indicated that it is known that there are unauthorized groundwater dischargers and that the MDNR does not know the impact of those discharges, especially of chlorinated chemicals. Dr. Fischer asked for examples of unauthorized discharges. Ms. MacKenzie-Taylor responded that floor drains in small auto repair shops is one example. In addition, many small industries are discharging to the ground or groundwater without licenses. Such discharges could be going through unsaturated zones, but generally go through some sort of discharge system, such as seepage lagoons or spray irrigation systems. Dr. Fischer asked whether most contamination was through unauthorized discharges. Ms. MacKenzie-Taylor answered that the MDNR does not know.

Dr. Demers asked whether increases in monitoring requirements have been paralleled by increased staffing at the MDNR. Ms. MacKenzie-Taylor answered that there may have been an increase for the hazardous waste program, but not for the groundwater program. Mr. Kenneth Burda, MDNR Waste Management Division, stated that there had been only a very small increase for the hazardous waste program staff. Dr. Demers asked whether there had been staffing decreases. Ms. MacKenzie-Taylor stated that there had been for the groundwater program.

Dr. Premo asked what the MDNR's measure of success was for the solid and hazardous waste management program. Ms. MacKenzie-Taylor answered that the more stringent regulations have been in effect for the past 10 years. Improved design and monitoring requirements have been implemented for solid waste landfills, for instance, where there had previously been contamination.

Dr. Premo asked whether there are any data on the status of hazardous waste sites in the state. Mr. Burda answered that there are fewer hazardous waste treatment, storage, and disposal sites. Probably 3 quarters have been closed or cleaned. Those in operation are well monitored. No contamination has been found at the newer facilities because the facilities are designed and operated within the regulations. There has also been a significant, probably 50%, reduction in the amount of hazardous waste generated in the state. Mr. Harrison asked whether violations have increased. Mr.

Burda replied that there had been some violations. The real deficiency in the state's program is in the generation of waste, where there has not been much oversight.

Dr. Fischer asked whether it would assist the MDNR if all chlorine-containing compounds were grouped as a class, shortening the list of regulated compounds. Ms. MacKenzie-Taylor answered that it would not. There would still be many other compounds to deal with. Non-chlorinated compounds are being generated also. It would not reduce the volume of solid waste. She indicated that she did not think that chlorinated organics were a major problem with groundwater discharge.

Dr. Fischer asked whether disposal of PVC pipe was a solid waste problem or whether it was incinerated. Ms. MacKenzie-Taylor said that it was not a major solid waste problem. She did not know whether it was going into incinerators, but there was no regulation to prevent it. PVC pipe can be disposed of by anyone and, when it is discarded, can go either into a landfill or an incinerator. Ms. Simon indicated that she would provide the Panel with some additional information on this question.

Mr. Gary Hurlburt and Mr. Gerald Saalfeld, MDNR Surface Water Quality Division, provided an overview of Michigan's water pollution control regulations. A summary of the presentation is contained in Attachment 4.

Dr. Fischer asked about the use of caged fish versus end of the pipe effluent analysis for a National Pollution Discharge Elimination System (NPDES) permit, and when are unidentified peak evaluations are required. Mr. Saalfeld answered that when there is a potential for a variety of chemicals that go beyond the Critical Materials Register or the federal priority pollutant list, the presence of chemicals that MDNR would call unknown, or when there is a complex industrial process involved, MDNR will require that additional tests be performed and will also require that the unidentified peaks be identified and monitored.

Dr. Fischer asked if, for example, that would involve letting the chemicals bioaccumulate in caged fish and then analyzing them for specific chemicals. Mr. Saalfeld answered that that was correct, but that wild or native fish would be receiving the same analytical treatment. With fish bio-uptake studies, MDNR would be looking for chemicals with bioaccumulative capabilities. If unidentified peaks are found, the permit requires the permittee to identify the chemical. Unknown substances with a high enough background to peak noise ratio would be identified. Dr. Fischer asked what percentage of permits have this requirement. Mr. Saalfeld answered that, while he did not know the exact number, it was not a high percentage of total permits.

Dr. Premo stated that the MDNR often requests scans, which are the basic USEPA methods developed to scan for a variety of compounds which are grouped according to their characteristics and the way that they can be easily be quantified. The VOCs are among those scans, covering at least 34 different compounds. MDNR will request Scan 1 and Scan 2 for VOCs, for the purpose of monitoring or site investigation. Another scan which quite often get requested is called polynuclear aromatics (PNAs) which

cover 11 additional compounds. A fourth scan periodically required is for the 54 based neutral compounds and acid fraction. Unidentified peaks must be reported, with their location on the scan, to the MDNR. Mr. Saalfeld added that chromatograms are also required in many cases.

Dr. Fischer stated that he would like to obtain an estimate of the number of unidentified compounds that are escaping into the environment, how many might be chlorinated compounds and how often unidentified peaks occurred. Dr. Premo said that unidentified peaks are not always present. Mr. Saalfeld pointed out that water and fish samples taken by the MDNR were analyzed the same way. Dr. Premo stated, however, that in the case of petroleum impacted sites, when PNAs are requested and the GCMS mass spectrometer methodology is used, there are commonly large peaks representing heavier hydrocarbons that are not on the list.

Dr. Demers asked Mr. Hurlburt for clarification of the numbers of regulated chemicals. There are 115, of which 51 are chlorinated. Another list consisted of 285, of which 110 are chlorinated. Mr. Hurlburt explained that the 115 were those that were recently put under permit, with allowable levels. The list of 285 consisted of chemicals for which a potential allowable level had been established after review. Some of the latter might or might not have high toxicity, be bioaccumulative, or be persistent. They need to be watched to make those determinations. Those on the Michigan Critical Materials Register have been determined to be of high environmental concern because of properties like persistence, bioaccumulation, carcinogenicity or reproductive and developmental effects. They are chemicals for which a lot of data is available and that have been carefully screened. They are inventoried annually in order for the MDNR to monitor their use and discharge.

Dr. Demers asked how many of the 115 were chlorinated. Mr. Hurlburt indicated that 51 were chlorinated compounds. Mr. Saalfeld said he could obtain the number of pounds of chlorinated compounds that have been reported discharged by permittees. Mr. Harrison said he would like to see a comparison for chlorinated versus non-chlorinated compounds.

Mr. Harrison asked Mr. Hurlburt how effective he thought current regulations were in terms of protecting Michigan citizens and the environment. Mr. Hurlburt answered that Public Act 245 has broad powers and that the specific regulations that have been developed are thorough.

He stated that the volume of chemicals being released has steadily declined as the NPDES permit program has continued to improve. In terms of protecting public health, he said that the concentrations of chemical contaminants continue to diminish in the environment. Water pollution control programs are having an impact. Business and industry are implementing pollution prevention methods in order to meet the NPDES permit limits. The paper and pulp industry, for instance, has made substantial changes in order to meet the very low allowable levels for dioxin. The automobile manufacturers have agreed to voluntarily use pollution prevention methods to reduce the use of 60

plus compounds, about 30% of which are chlorinated. However, the resources needed to maintain the programs have continued to diminish. There are a number of things that could be done better. There are permit backlogs. The Critical Materials Register needs to be reviewed and criteria developed; it is not being implemented to the extent it could be.

Mr. Saalfeld added that the MDNR has been seeing improvements in the biological integrity of the streams. There are still problems, but contaminant levels have declined over the past 20 years. One of the current limitations is MDNR's current analytical capabilities. If a substance is released that cannot be analyzed, there is little ability to regulate it. He would like permittees releasing an unknown substance to be responsible for developing methods of analysis. It is currently voluntary.

Mr. Hurlburt added that other measurements are indicators of improvement. Wildlife are returning and reproducing. Now that the populations are returning, the more subtle reproductive and developmental effects can be measured. Dr. Demers asked for examples of species which are increasing. Mr. Hurlburt indicated that he would get that information from the MDNR wildlife biologists for the Panel.

Dr. Premo reported a discussion with Chris Wood, MDNR, about some substances, like DDT, that are no longer produced, but are lingering in sediments, and are periodically released. Some sites may still be contaminated from previous times. They may still exceed the MDPH trigger level. They continue to be monitored, and there is no recommendation to remove them from the list.

Dr. Demers commented that although the narrative standard for Public Act 245 made inherent sense, he was concerned about the potential hazard of low staffing or inadequate resources, where it would be easier to ignore a problem if extensive investigative work had to be done in order to set a standard. Mr. Hurlburt indicated that despite the limited resources, the MDNR has not yet reached the level of diminished returns in terms of getting the necessary work done.

Dr. Fischer asked whether alternative chemical technologies, for instance those being tried in the paper and pulp industry, can be evaluated well enough currently to assure that they will not be of concern at a later date. Mr. Saalfeld responded that he did not know all the answers about the substitutions, but that the industry permits require that the MDNR be notified of any changes in effluent quality. The current dioxin reduction efforts seem very positive. Dr. Fischer again expressed concern that while the focus is on reducing dioxins, characteristics of the substitutes may not be adequately analyzed. His concern is that substitutes may be being put in place without the level of scrutiny that has been applied to the compounds that are known to be dangerous now. The methods used for detecting chlorinated products may not detect other dangerous chemicals. Mr. Saalfeld said that the fish contaminant monitoring program and other current efforts using broad spectrum scanning and, where needed, a toxicity application reduction evaluation, should show other chemicals. In addition,

permits require minimum toxicity data for new chemicals and margins of safety would be added.

Mr. Jim Cleland, Michigan Department of Public Health (MDPH) Drinking Water Division, provided an overview of MDPH's public water supply program. The MDPH program oversees public water systems in the state, from systems that serve as few as 25 people, to the Detroit system. Mr. Cleland's presentation is contained in Attachment 5.

Dr. Fischer asked whether Mr. Cleland thought that public health would be compromised if chlorine use were eliminated. Mr. Cleland answered that the amount used for disinfection of drinking water and wastewater is no more than 5% of the total used. However, its elimination for these purposes would have a dramatic effect. In fact, the USEPA is proposing that more water systems disinfect in the future, since all are not required to now. The other alternatives for residual disinfection, bromine and iodine, are not used now.

Dr. Fischer asked whether it would be evident if chlorinated compounds were impacting public health. Mr. Cleland said he believed so. First, water is tested directly for 84 regulated contaminants, and Michigan tests for 150 more, including pesticides and other byproducts. A new regulation proposed in February will require monitoring for a whole series of disinfection byproducts that have never been looked at in detail before. It is scheduled to begin by October and will be required for a period of 8 months for all utilities serving 10,000 or more. The purpose is to develop a national database to analyze for future regulation of disinfection byproducts in drinking water. There is currently regulation of just one family of disinfection byproducts, total trihalomethanes, a group of 4 trihalomethane compounds, chloroform being the most common. The disinfection byproducts of ozone are even less well understood.

Dr. Fischer asked whether Mr. Cleland was aware of any epidemiological studies that have compared health outcomes from chlorinated drinking water and non-chlorinated water. Mr. Cleland answered that there have been a number of published studies. The USEPA believes the increased incidence of cancer in systems using chlorinated water is primarily due to chlorine byproducts, as opposed to the chlorine itself. It is generally accepted in public health that chlorinated drinking water increases the risk of some cancers. The trade-off is that chlorine stops helps prevent disease outbreaks of typhoid fever and cholera. The new rules will regulate the byproducts which will determine what alternative treatment techniques the utility may use to meet new safety standards. The increased cancer risk can be reduced without eliminating the primary treatment with chlorine, but just reducing the amount of chlorine used. The only reason the USEPA has not urged alternative available technologies is that they are prohibitively costly.

Mr. Tom Hoogerhyde, MDPH Environmental Health Division, spoke about the MDPH public swimming pool program. MDPH regulates about 5,000 public swimming pools throughout Michigan. He stated that the only suitable disinfectants for swimming pools are bromine and chlorine. Approximately 1/3 of the pools are disinfected with bromine

and the rest are disinfected with chlorine. The rules require that a minimum of 4/10 mg/l of chlorine be maintained in the swimming pool if the ph is between 7.2 and 7.6, and a minimum of 1 mg/l if the ph is between 7.7 and 8.0.

Mr. Harrison asked if chlorine is used exclusively in private pools, and what chemical would be used if chlorine were not available. Mr. Hoogerhyde responded that private swimming pools do tend to use chlorine almost exclusively, and that there are more private than public pools in the state. Bromine is used mostly in smaller pools, and that it is the only other suitable chemical. Erosion-type feeders must be used for applications of bromine in smaller pools; very larger feeders would be needed to service larger pools. Bromine has not been marketed for public use, and generally is not available for use in private pools.

Dr. Fischer asked if the potentially cancer causing chlorinated by-products of water could be absorbed through the skin while swimming; and, also if there are any studies on the higher incidence of cancer in swimming pool owners versus non-swimming pool owners. Mr. Hoogerhyde commented that he doubted if it could be absorbed through the skin, and that he is not aware of any studies that have been done.

Mr. Bob Craig, Deputy Director, Michigan Department of Agriculture (MDA), stated that MDA has a program that involves the controlling VOCs at all Michigan gas stations. He pointed out that this particular program has very little to do with chlorine, however, certain air toxics are controlled by virtue of the vapor recovery programs. As part of the state's clean air strategy, MDA implements and controls stages for 10 ozone non-attainment counties in Michigan.

Dr. Fischer asked if the same kind of Stage 1 vapor recovery system could be used for liquid chlorine. Mr. Tom Hoermann, BASF Corporation, responded that in most cases, liquid chlorine would be shipped in high pressure cylinders. Any leaks would be eliminated by the safe design and handling of the cylinders. He stated that if it was a chlorinated solvent, the air pollution regulations would minimize the amount of emissions using a vapor balance system.

[**Dr. David Wade** (MDA) was also scheduled to speak to the Chlorine Panel on MDA's pesticide program. He was unable to attend. A copy of his presentation is attached (Attachment 6) to this meeting summary.]

Officer Paul Clift, Michigan State Police (MSP) Fire Marshall Division, spoke about the regulations for transporting chlorine and other hazardous substances in Michigan. Michigan is regulated by federal transportation regulations that were adopted into the Michigan Compiled Laws in 1990. A copy of Officer Clift's presentation is attached (Attachment 7).

Dr. Fischer asked if the MSP regulates the movement of hazardous waste. Officer Clift responded that MDNR is the lead agency on hazardous waste in Michigan. The MSP would check to see if the material was manifested correctly and in the proper container. The MSP would also contact the MDNR if a problem was suspected.

Dr. Fischer asked if the MSP knows when a truck containing hazardous waste comes into the state. Officer Clift indicated that the MSP does not. Dr. Fischer also asked if there was anything required of such trucks at the state's weigh stations. Officer Clift stated that there was not. Mr. Burda, MDNR, added that all hazardous waste vehicles are required to be licensed, properly marked and have the necessary waste manifests. MDNR enforces the hazardous wastes regulations through periodic road stops, at weigh stations, and at the borders. Officer Clift stated that some chlorine is transported by rail, however, most is transported by truck. In response to a question from Dr. Demers, Officer Clift noted that he was not aware of any recent road or rail mishaps in the state involving chemicals.

Lt. Gene Schmitt, MSP, spoke to the Panel about Public Act 207 of 1941 and its regulation of fire extinguishers. Lt. Schmitt indicated that in the Act, there are 11 different compounds which may be used to extinguish fires. Some of these contain chlorinated compounds and some do not. In 1987, 24 countries signed a treaty (1987 Montreal Protocol) to regulate agents that deplete the ozone layer. As a result of this treaty and the recent federal Clean Air Act amendments, production and use of ozone depleting halons has been reduced. This has resulted in the need to develop non-halon substitute fire extinguishants. One substitute recently accepted by the USEPA, without use restrictions, as an alternative for ozone-depleting halon 1301 is FM-200TM.

Mr. Harrison asked if the substitutes being looked were being evaluated also in terms of their impact on humans and the environment or were they only being evaluated in terms of their capability to suppress fire. Lt. Schmitt indicated the he was uncertain but that he would find the answer and provide it to the Panel.

IV. PUBLIC COMMENTS AND QUESTIONS

Mr. Dave Dempsey, Clean Water Action, commented on Ms. MacKenzie-Taylor's presentation regarding the groundwater discharge program. Mr. Dempsey indicated that a MDNR work group, has estimated that 96% of the more than 6,000 groundwater discharges in the state do not comply with Act 245 requirements. He indicated that the groundwater program is inadequate in its protection against discharges from chlorinated compounds due to MDNR's low staffing in the compliance area. He pointed out that although a majority of the unrelated or non-compliance sources do not discharge chlorinated compounds, some others which use chlorinated compounds, such as auto repair facilities and dry cleaners, may be causing contamination.

Dr. Premo asked how the discharges were identified. Mr. Dempsey responded that estimates were made from pilot projects that received special funds to do groundwater checks at facilities, including auto facilities, laundromats, etc., that were being inspected. The 6,000 figure was an extrapolation to the entire state. Dr. Premo asked if

the MDNR work group had developed any recommendations. Mr. Dempsey responded that the work group should have some recommendations in the near future.

Mr. Dempsey also commented on the United States General Accounting Office (USGAO) 1991 report, pointing out that the USGAO evaluated and found that federal environmental laws do not, in many cases, adequately protect humans from reproductive and developmental effects from chemical exposures. Mr. Dempsey suggested that the Panel look at the type of risk assessment assumptions that are used in Michigan, since Michigan's laws are pattern after federal laws.

Dr. Joe McDade, Dow Chemical, commented on a study that was conducted 2 years ago by the International Agency for Research on Cancer (IARC). He indicated that the IARC looked at about 30 to 35 global epidemiology studies, and concluded that chlorinated drinking water was a Group 3 substance, unclassifiable as to its carcinogenicity for humans. Dr. McDade indicated that he would provide the Panel with a copy of the monograph.

V PANEL ASSIGNMENTS

Dr. Fischer stated that there were no changes to the Panel assignments.

VI NEXT MEETING DATE

Subsequent meetings were not planned.

VII ADJOURNMENT

The meeting was adjourned at 4:43 p.m.

Keith G. Harrison, M.A., R.S., Cert. Ecol.
Executive Director
Michigan Environmental Science Board

ATTACHMENT 1. Presentation by Lynelle Marolf, MDNR Environmental Response Division.

The MDNR administers Public Act 307 of 1982, as amended, (Environmental Response Act) and several operational memoranda which are applicable to chlorine. The essential components of the Act are:

1. Provides a framework for all environmental clean ups undertaken in Michigan,
2. Provides standards for liability,
3. Gives the MDNR the authority to enforce the provisions of the Act,
4. Provides for an allocation process,
5. Provides a dispute resolving process for technically related matters and site cleanup,
6. Addresses the release of hazardous substances into the environment, and
7. Defines hazardous substances into categories: those defined under RCRA and superfund, petroleum, and other substances injurious to public health, safety, welfare or the environment.

The Act's Administrative Rules provide the compliance criteria requirements for 3 different levels (Types A, B, and C) of environmental clean up that may be approved by the MDNR. A Type A clean up means a clean up which reduces hazardous substance concentrations to levels that do not exceed background or method detection limits. Type A clean ups generally apply: (1) to spills and situations where contamination is relatively limited, (2) when the proposing party wishes to remove contaminants to nondetectable levels, (3) to contaminants which have risk-based criteria that are below method detection limits, (4) to contaminants where there are insufficient data available to establish risk-based criteria and (5) to materials which occur naturally in the environment.

A Type B clean up means a clean up which reduces hazardous substance concentrations to levels that do not pose an unacceptable risk on the basis of standardized exposure assumptions and acceptable risk levels. Type B clean ups generally apply at sites where the desired outcome is to allow the site to be returned to unrestricted use at the completion of the remedial action although an acceptable concentration of contaminant may be left in place. In addition to other pathways, considerations are made for groundwater in that groundwater concentrations must be reduced to allow the groundwater to serve as a drinking water source. Specific criteria

for carcinogenic and non-carcinogenic hazardous substances are provided for in the MDNR's MERA Operational Memorandum #8, Revision #8.

A Type C clean up means a site-specific clean up which reduces hazardous substance concentrations to levels that do not pose an unacceptable risk. Type C clean ups generally apply at the largest and most complex sites, and at sites where the uses of the property will be limited at the completion of the remedial action. Specific criteria for carcinogenic and non-carcinogenic hazardous substances are provided in MDNR's MERA Operational Memorandum #14,

MDNR use a 1:1,000,000 risk factor for carcinogens and human life cycle safe concentrations for non-carcinogens.

Part 8 Rules describe the numerical risk assessment model used by the MDNR to assess and score an environmentally contaminated site based on the relative present and potential hazards associated with the site.

ATTACHMENT 2. Presentation by Cathy Simon, MDNR Air Quality Division.

STATE REGULATIONS DIRECTLY IMPACTING USE OF CHLORINE COMPOUNDS

Part 2 - Air Toxic Rules: Rules 230 - 232

Included in the part 2 rules are rules to control the emission of toxic air contaminants (Rules 230 - 232). The requirements of these rules are summarized below.

Applicability

The rules apply to all new or modified sources of toxic air contaminants for which a permit to install is required.

Toxic Air Contaminant Definition

A toxic air contaminant includes any air contaminant for which there is not a National Ambient Air Quality Standard (NAAQS) or which is not specifically exempted in the rules (40 compounds are specifically exempted).

Requirements

There are two basic requirements of the air toxic rules. First, a source must apply best available control technology for toxics (T-BACT). Secondly, after the application of T-BACT, the emissions of the toxic air contaminant cannot result in an ambient impact that exceeds a health based screening level. The rules specify methodologies for determining the health based screening levels for both carcinogenic and non-carcinogenic compounds.

Exemptions

The rules allow for exemptions from T-BACT for small sources of certain toxic air contaminants that are considered low toxicity or have a low cancer potency.

STATE REGULATIONS INDIRECTLY IMPACTING USE OF CHLORINE

Part 3 - Particulate Matter

The Part 3 rules apply to all sources of particulate matter. These rules specify emission limitations for sources of particulate matter that essentially results in the application of reasonably available control technology. Rules to control the emission of fugitive dust are also included in the Part 3 rules. Additionally, the State Air Pollution Act (Act 348 of 1965, as amended) specifies control measures for fugitive dust.

Part 6 - Existing Sources of Volatile Organic Compounds

The Part 6 rules apply to existing sources of volatile organic compounds (VOCs). These rules require the application of reasonably available control technology for the following source categories: gasoline marketing and storage, coating operations, degreasing operations, dry cleaners, petroleum refineries, manufacture of polystyrene and other organic resins, paint manufacturing, pharmaceutical manufacturing, and synthetic organic chemical manufacturing (leak detection and repair program only). Additional source categories will be added in the future due to the federal Clean Air Act Amendments of 1990.

Part 7 - New Sources of Volatile Organic Compounds

The Part 7 rules apply to all new sources of volatile organic compounds. These rules require the application of best available control technology (BACT) for all new sources.

Part 9 - Emission Limitations and Prohibitions - Miscellaneous

Rule 901 prohibits the emission of any air contaminant that causes injurious effects to human health or safety, the environment, or unreasonably interferes with the comfortable enjoyment of life and property.

FEDERAL REGULATIONS WHICH IMPACT CHLORINE USE

Title III - Air Toxics

List of Pollutants and Source Categories: Law lists 189 hazardous air pollutants. One year after enactment EPA lists source categories (industries) which emit one or more of the 189 pollutants. In 2 years, EPA must publish a schedule for regulation of the listed source categories.

Maximum Achievable Control Technology (MACT): MACT regulations are emission standards based on the best demonstrated control technology and practices in the regulated industry. MACT for existing sources must be as stringent as the average control efficiency or the best controlled 12% of similar sources excluding sources which have achieved the LAER within 18 months prior to proposal or 30 months prior to promulgation. MACT for new sources must be as stringent as the best controlled similar source. For all listed major point sources, EPA must promulgate MACT standards - 40 source categories plus coke ovens within 2 years and 25% of the remainder of the list within 4 years. An additional 25% in 7 years and the final 50% in 10 years.

Residual Risk: Eight years after MACT standards are established (except for those established 2 years after enactment), standards to protect against the residual health and environmental risks remaining must be promulgated, if necessary. The standards would be triggered if more than one source in a category exceeds a maximum individual

risk of cancer of 1 in 1 million. The residual risk regulations would be based on current CAA language that specifies that standards must achieve an "ample margin of safety". Residual risk only applies to major sources.

Accidental Releases: Standards to prevent against accidental release of toxic chemicals are required. EPA must establish a list of at least 100 chemicals and threshold quantities. All facilities with these chemicals on site in excess of the threshold quantities would be subject to the regulations which would include hazard assessments and risk management plans. An independent chemical safety board is established to investigate major accidents, conduct research, and promulgate regulations for accidental release reporting.

Other Issues: A study of area source emissions and a strategy to reduce the cancer incidence from these emissions by 75% is required. Regulation of source categories accounting for 90% of the emissions of the 30 most hazardous area source pollutants. Coke ovens can receive an extension of the residual risk standards until 2020 in exchange for compliance with stringent emission standards. Air toxics regulations of utilities will be based on the results of toxic emissions studies. A study of deposition to the Great Lakes, Lake Champlain, Chesapeake Bay and coastal waters will determine whether additional regulation is needed. Regulations are required for all types of municipal waste combustors and an exclusion for facilities which burn 30% or less municipal waste.

Title VI - Stratospheric Ozone & Global Climate Protection

Listing: EPA must list specified ozone depleting substances with their ozone-depletion potential, chlorine/bromine loadings, atmospheric lifetimes and global warming potentials within 60 days after enactment. EPA to add to list at least every 3 years substances meeting specified criteria.

Phase-out: Phase-out dates are similar to Montreal Protocol for Class I (2000 for CFC, halon and carbon tetrachloride; 2002 for methyl chloroform), but with more stringent interim reductions. Class II (HCFC) substances phased out by 2030. Regulations for Class I required within 10 months, Class II by 12/31/99.

Exchange: Requires a net environmental benefit from trades of allowances to produce controlled substances. Regulations required within 10 months after enactment.

Recycling/Use Limits: Restricts use and emissions to LAER, requires maximum recycling and safe disposal for CFC refrigerants within 2 years, all other class I and II substances within 4 years. Illegal to vent class I or II refrigerants after 7/1/92. Prohibition on venting any environmentally harmful substitute refrigerant after 5 years.

Mobile Air Conditioners: Mandatory recycling after 1/1/92. Certification of equipment and personnel. Ban on small containers (except certified personnel).

Non-essential Products: Bans non-essential products that result in releases of class I substances within 2 years. Beginning 1994, ban use of class II substances in aerosols and non-insulating foams, with exemptions for flammability and safety. Regulation 1 year after enactment, effective after 2 years.

Labeling: Mandatory warning labels on all containers of products made with and containing class I or class II substances (depending, in some cases, on availability of safe alternatives). Regulations required within 18 months after enactment, effective 30 months after. In case of labeling, requirements applicable to containers of Class I and II substances and to products containing Class I substances. All Products must be labeled by 2015.

Safe Alternatives: Requires prior notice of sale of new and existing chemicals for significant new use as substitute. EPA to publish list of safe and unsafe uses of substitutes for Class I and II as identified. Gives authority to restrict the use of unsafe substitutes. Rules required within 2 years of enactment.

Procurement: Requires all Federal Agencies to amend their procurement regulations to maximize the use of safe alternatives for Class I and II substances. Regulations required within 18 months after enactment, effective 30 months after.

Methane: EPA to publish 5 reports to Congress within 2 years, and 1 follow-up report within 4 years.

ATTACHMENT 3. Presentation Outline of Deborah MacKenzie-Taylor, MDNR

I MICHIGAN' S GROUNDWATER PROGRAM

- A. Michigan Water Resources Commission Act, Public Act 245 of 1929, as amended, Part 22 Rules
- B. Provides for authorization of wastewater discharges to the ground or groundwater.
- C. Requirements to obtain a permit to discharge:
 - 1. Hydrogeologic investigation
 - 2. Effluent monitoring
 - 3. Groundwater monitoring
 - 4. Appropriate treatment to meet discharge limits for the effluent and groundwater
- D. Goal - Act 245, Part 22 Rules provide for nondegradation of groundwater quality in usable aquifers.
- E. How is goal accomplished?
 - 1. Effluent limits - below the limits of detection for organic chemicals (including chlorinated organic chemicals).
 - 2. Groundwater limits - especially for chlorinated wastewater since residual chlorine may react with humic materials in soils to produce additional disinfection by-products.
- F. Management and permit standards include:
 - 1. Environmental assessment (risk assessment for incinerators)
 - 2. Monitoring programs.
 - a. air
 - b. groundwater
 - c. surface water
 - d. soil
 - e. sewer discharge
 - 3. Waste analysis plans
 - 4. Contingency/emergency plans
 - 5. Financial assurance for closure
 - 6. Detailed design plans and specifications
 - 7. Construction certification requirements
 - 8. Siting criteria

9. Hydrogeological and monitoring reports
10. Detailed operation procedures
11. Detailed operation records
12. Treatment requirements for land disposal
13. Inspections and reporting

G. Goals of the Hazardous Waste Program

1. Provide safe and effective management of hazardous waste
2. Use better technology
3. De-emphasize use of land disposal facilities
4. Use less toxic materials
5. Promote efficiency and generate less waste

H. How are goals accomplished?

1. Mandate stringent waste management standards
2. Stringent regulation for design and operation of incinerators and landfills
3. More restrictive standards for more toxic materials
4. All wastes are required to be treated prior to land disposal to reduce toxicity and mobility in a landfill setting
5. Landfills designed to provide adequate protection in conjunction with treatment requirements
6. Extensive monitoring requirements to assure containment
7. Due to stringent and expensive standards, rising cost of hazardous waste management causes a reduction in waste generated

II MICHIGAN'S HAZARDOUS WASTE PROGRAM

A. Overview of Hazardous Waste Regulations

1. Michigan Hazardous Waste Management Act, Public Act 64 of 1979, as amended
2. Resource Conservation and Recovery Act of 1976, as amended
3. Hazardous and Solid Waste Amendments of 1984, as amended

B. Manufacturing and use of chlorinated products produces wastes - some of which are termed hazardous wastes.

C. Hazardous wastes containing chlorinated chemicals may be classified based on a characteristic (e.g. toxicity characteristic) or as a listed waste.

D. The Hazardous Waste Program only deals with the management, treatment and disposal of hazardous waste - does not deal with releases of chlorine or chlorinated chemicals as part of the manufacturing process.

E. The Hazardous Waste Program is termed a "cradle to grave" management system - regulates all aspects of hazardous waste management:

1. Generator management standards
2. transporter management standards and licensing
3. Management standards for all treatment, storage and disposal facilities (TSDs) including permitting, monitoring, compliance and enforcement
4. Manifest tracking system

III MICHIGAN'S SOLID WASTE PROGRAM

A. Michigan Solid Waste Management Act, Public Act 641 of 1978, as amended

B. No regulated hazardous wastes - waste characterization

C. Management, licensing and permitting of non-hazardous solid waste landfills

1. Environmental assessment
2. Siting criteria
3. Detailed design and construction requirements
4. Construction certification requirements
5. Monitoring programs
6. Hydrogeological and monitoring reports
7. Financial assurance for closure
8. Inspections and reporting

D. Goals

1. Safe and effective management of solid waste
2. Waste minimization

E. How are goals accomplished?

1. Operation and design requirements
2. More restrictive standards for more toxic materials
3. Extensive monitoring requirements to assure containment
4. Provisions for reuse and recycling of low hazard waste materials

ATTACHMENT 4. Presentation by Gary Hurlburt and Gerald Saalfeld, MDNR

Public Act 245 of 1929 regulates and protects the water resources of the state and the Great Lakes. It requires registration of manufacturing products, production materials and waste products, establishes permits to regulate discharge and storage materials, establishes restrictions to ensure compliance, and establishes some means for pollution prevention and prohibition of pollution to the waters of the state.

It establishes pollution standards for lakes, rivers and streams. It gives the MDNR the ability to issue permits to assure compliance with state standards; to regulate municipal, industrial, commercial discharges and storage; and to make rules and orders restricting the polluting content of any waste material or polluting substance to be discharged into lakes, streams or other waters of the state. It provides for pollution prevention which is deemed necessary and in the public interest.

The Act includes a general statement that it is illegal for any person directly or indirectly to discharge into the waters of the state any substance which is or may become injurious to the public health, safety, or welfare. It provides for an annual inventory of chemicals on a Register of Critical Materials that are in use and being discharged in wastewater to either surface water or to any sewer system in the state. The Act makes it illegal to discharge to the waters of the state without a permit and gives the MDNR authority to curtail imminent or existing pollution.

Part 4 of the regulations address toxic substances, and so are applicable to chlorine. Rule 57 of Part 4 deals with establishing water quality standards for toxic substances. It applies to chemicals listed on Michigan's Critical Materials Register, the federal priority pollutants list, and any other toxic substances, as determined by the director of the department. Water quality standards are in narrative, not in numerical terms. This gives the MDNR the flexibility to address new data as they become available without the time and expense necessary to change the rules and regulations. The standard states that toxic substances shall not be present in the waters of the state at levels which are or may become injurious. Allowable levels are established, generally using a chemical-specific approach. The allowable levels are based on either a health-based approach or through treatment technology limits. Whichever is most conservative applies.

A margin of safety is added to the aquatic maximum allowable concentration, or, in the case of wildlife and human health, the no adverse effect level. These are applied at the edge of a mixing zone after they have reached the receiving waters of the state. For carcinogens, a level of risk of no greater than 1:100,000 is established. The guidelines on setting levels are fairly extensive.

There are currently acceptable levels established for 115 substances. Of these 115, 51 are chlorinated compounds. There are over 285 compounds for which levels are established, but not all have yet to be placed in permits. Of those, at least 107 are chlorinated substances.

The most powerful way to achieve these allowable levels in the state's waters is through the National Pollution Discharge Elimination System permitting process. There are a number of permit conditions that may come into play to control contaminants. The treatment technology approach, water quality standard based approach, monitoring permit requirements, or specific effluent limits might be used, depending on the level of potential discharge. Effluent testing requirements looking at both acute and chronic effects may be implemented, and methods such as chemical minimization programs or alternative processes, as are currently being used in the pulp and paper industry with chlorine use in the Kraft mill process. Such programs reduce the levels of AOX, dioxin, and furans stemming from the production process. The MDNR also conducts fish contamination monitoring for bioaccumulative chemicals, as well as effluent chemical and sludge characterizations.

Under Part 5, Spillage of Oil and Polluting Materials, secondary containment is required in order to prevent the uncontrolled release of chemical substances in case of accidents. This requirement applies to oil (including gasoline), salt (including calcium and sodium chloride) and any substance on the Critical Materials Register. It requires that the MDNR be notified immediately of any spill, and that it receive a report of the incident and remediation.

Part 9 deals specifically with wastewater reporting and establishes the Register of Critical Materials, a list of chemicals of high environmental concern. It requires an annual report of the use, discharge, and disposal of critical materials by business and industries that have some type of wastewater discharge. About 4,000 reports are being received annually, covering 6.2 billion pounds of materials, and identifying 7 to 7½ million pounds of chemicals being discharged into the environment, and 172 to 174 million pounds of residuals. Currently, 284 chemicals or classes of chemicals are included on the Register. Of these, over 110 are chlorinated. When considering the number of individual salts, esters, congeners, etc. contained in classes of compounds, over 500 chlorinated chemicals would be included on the Register. Thirty-five additional compounds, of which 13 are chlorinated, are about to be added to the list.

ATTACHMENT 5. Presentation of Jim Cleland, MDPH Drinking Water Supply

There are 2 uses for chlorine and disinfection products in water safety. The first is in disinfecting water to make it safe, and the second is for disinfecting facilities that come in contact with water prior to use - storage basins, wells, pipelines, reservoirs, etc. Disinfection of water in the U.S. consists of 2 distinct processes. The purpose of the first process is to satisfy the demand created by the substances in the water that produce oxygen. The second is to maintain a residual in the distribution system so that once the water leaves the treatment plant there is a residual disinfection capability from the point of delivery to the customer tap. In Europe distribution disinfection and residual disinfection are not done. The chlorine disinfection process may itself create unwanted byproducts, depending on what is already in the water. In that case potassium chromanganate and ozone treatment can be used. There are 3 ozone plants in Michigan, 1 in Monroe, 1 in Bay City, and 1 being designed in Ann Arbor. In each case the water source demands a more powerful oxidant. These plants are also intended to reduce the use of free chlorine, which produces more byproducts. They will use a mixture of chlorine and ozone, using ozone at the front end, and chlorine on the distribution end. Chlorine use will be reduced by well over 50%, perhaps as much as 90%. It is generally accepted that chlorine is necessary for distribution, but substantially less is used in the entire process. The process is cost-effective for large systems, but not for small ones.